CHAPTER 1

INTRODUCTION AND POLICY

TED GEILEN

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I. INTRODUCTION AND SUMMARY

The Division of Ratepayer Advocates (DRA) has analyzed San Diego Gas & Electric Company's (SDG&E) application requesting authority to implement an Advanced Metering Infrastructure (AMI) and recover over $719 million in costs from ratepayers. SDG&E's AMI application is not cost effective as proposed. But it is possible that AMI deployment can be done cost-effectively in SDG&E's territory. Accordingly, DRA recommends that the Commission invite SDG&E to submit an amended or new proposal, if and when SDG&E determines that the deployment can be done cost-effectively. In its testimony, DRA suggests ways the current proposal could be improved to reduce costs and risks, or increase benefits. These possible improvements include: more effective peak-shaving time variable tariffs; new services that support better energy management by customers; and reducing costs by eliminating certain technical requirements.

TABLE 1-1
DRA Adjustments to SDG&E Application[1]

Chapter & Witness	**Adjustment Category**	**SDG&E AMI SYSTEM Proposed Cost $719M**	**SDG&E AMI SYSTEM Proposed Benefit[2] $783M**
Ch 1, Geilen	2 lifetime -> 1 lifetime	- $105 M	- $153 M[3]
Ch 3, Liang-Uejio	Avoided DR Program	N/A	- $50 M
Ch 3, Liang-Uejio	DR Participation	N/A	- $68 M[4]
Ch 12, Geilen	Info-feedback	N/A	+ $30 M
Ch 16 Chan	DR Cap. $85 -> $52	N/A	- $38 M[5]
Totals		$614 M	$504 M

1 Net present value in revenue requirement (PVRR) in 2006 dollars
2 Changes in Table 1-1 are shown in iterative fashion. Three row entries regarding DR Benefits interact.
3 Value is order-dependant. Assuming SDG&E participation rates and SDG&E Capacity Value.
4 Value is order-dependant. Assuming DRA analysis period, but SDG&E Capacity Value (still at $85).
5 Value is order-dependant. This reduction assumes DRA analysis period and DRA participation rates.

II. ORGANIZATION OF DRA'S REPORT

DRA's report is presented in four parts: Policy, Demand Response (DR), Benefits Analysis, and Technology. The order and titles are as follows:

	Chapter	**Witness**	**Chapter and Title**
Part 1	Ch 1	Ted Geilen	Policy and Summary of Recommendations
	Ch 2	Chris Blunt	Ratemaking and Cost Recovery
	Ch 3	Louis Irwin	Project and Risk Management
Part 2	Ch 4	Tom Renaghan	Demand Response Benefits
	Ch 5	Scarlett Liang-Uejio	Rate Design, Participation Estimates and Avoided Demand Response Program Costs
	Ch 6	Cherie Chan	Avoided Capacity Costs
Part 3	Ch 7	Marshal Enderby	Meter Reading Benefits
Part 4	Ch 8	Steve Hadden	Functionality and Vendor Selection
	Ch 9	Ed Quiroz	Programmable Communicating Thermostats
	Ch 10	Ted Geilen	Information Feedback Systems
	Ch 11	Cherie Chan	Information Technology

III. CHANGES TO THE VALUATION OF SDG&E'S PROPOSAL

DRA recommends a number of specific changes to the cost and benefit valuations presented in SDG&E's application (see Table 1-1), including:

- Change period of analysis from two AMI system lifetimes to one lifetime (from SDG&E's 2007-2038 analysis to DRA's 2007-2026);
- Reduce savings from avoided demand response (DR) programs;
- Reduce Peak Time Rebate (PTR) participation estimates;
- Quantify benefits associated with information-feedback from website presentation of energy use for residential ratepayers;
- Reduce value of avoided capacity costs from $85/kW to $52/kW.

IV. IMPLEMENTATION RECOMMENDATIONS

Should the commission approve SDG&E's application in spite of its current lack of cost effectiveness, DRA staff recommends that SDG&E be required to:

- Accept risk-sharing mechanism on cost overruns.
- Support open programmable communicating thermostat (PCT) standards expected under the expected Title 24 update and advertise the PCT benefits to ratepayers when PCTs are available .
- Obtain license agreements from AMI communications manufacturers that allow in-home real-time information feedback device manufacturers free, or low-cost, access to electricity in real-time and gas hourly, or daily.

DRA's technical consultant, Plexus Research, evaluated the technical merits and cost estimates of the various AMI technologies considered (and some that were rejected) by SDG&E. Their recommendations include:

- Eliminate certain demanding technical requirements that increase costs beyond the incremental benefits that those requirements provide.
- In a revised or new solicitation and vendor contracts, better address technical challenges associated with the "mesh-network" architecture of the AMI communications system.
- Improve "acceptance test" criteria in contracts for AMI components, and account for these changes in cost estimates (may require obtaining revised bids).
- Correct certain warranty and meter life provisions from request for proposals (RFP) that are contradictory and inadequate for contracts.

Many of these recommendations could be implemented in conjunction with SDG&E's proposed field tests, and therefore would not slow down SDG&E's deployment. Implementing some of the recommendations, such as the one on acceptance testing, could actually save time (as well as money) in the long run, by detecting and

resolving technical problems early, so they do not cause delays or malfunctions during or after deployment.

V. IMPROVEMENTS - OBSERVATIONS ON DYNAMIC PRICING

DRA finds that both peak time rebate (PTR) and voluntary critical peak pricing (CPP) are subject to adverse self-selection. This means that the ratepayers whose electricity consumption increases markedly on the hottest critical days – i.e. those customers who have the greatest potential to reduce consumption in response to DR programs – will be the least likely to sign up for CPP or to curtail their consumption during PTR peak events. Rather, those ratepayers whose normal usage pattern does not significantly change during the hottest days constitute the group most likely to participate in the PTR program. Similarly, those ratepayers whose normal usage pattern is relatively low during peak periods can be expected to sign up for voluntary CPP.

As discussed by Ms. Liang-Uejio in Chapter 5, the PTR tariff does not offer a financial incentive to most consumers whose normal electricity use on critical peak days is well above the customer's baseline, which is based on lower usage days. It is important to note that, all other energy use being equal, the homeowner would have to allow the temperature in her home to rise to the difference between the average temperature on the five baseline days and the temperature on the peak day, just to stay at baseline consumption.[6] High peak load users in hot areas would have to cut their non-cooling electricity use way down (or turn the thermostat way up) during peak periods to earn a rebate. Many ratepayers with high air conditioner loads in hot areas that attempt to earn PTR credit will fail to reach baseline (or receive only partial credit) and stop participating.

[6] Heat transfer through building walls (and therefore much air conditioning load) is almost-directly proportional to the thermal gradient from the inside to the outside of the building envelope. This means that during the hottest days, people have to run their air conditioners longer to cool the house to the usual temperature.

A voluntary CPP program may be even less effective in reaching the high-peak users. It is simply unreasonable to expect an economically rational ratepayer to volunteer to pay a higher price for peak energy, when their default usage pattern is to use a great deal of peak energy. The ratepayers who can be expected to sign up are those who would benefit financially due to their current usage pattern – predominantly those customers in moderate climate zones.

Making CPP tariff mandatory would significantly increase the DR benefits, but this increase alone would be insufficient to close the gap calculated by DRA. Furthermore, mandatory CPP is not a measure which DRA endorses. Perhaps SDG&E can develop a dynamic pricing tariff that DRA can agree with, yet avoids the adverse self-selection problems that plague PTR and CPP.

VI. IMPROVEMENTS - ADDITIONAL SERVICES

As discussed by Mr. Quiroz in Chapter 9, there exists the potential to "expand the pie" by creating additional ratepayer benefits that may improve the business case as proposed in SDG&E's application. Privately purchased (with or without rebate) programmable communicating thermostats (PCT) have the potential to significantly expand the market for the CPP tariff by simultaneously increasing the financial benefit for participants and eliminating the inconvenience of running between telephone to thermostat on every event notice. San Diego ratepayers using PCTs in combination with CPP saved, on average, three times more than San Diego ratepayers without.[7] Once the market for PCTs is created as a result of California's Title 24 building code requirements, PCTs should be available in large retail stores. SDG&E should be directed to promote PCT use by PTR or CPP customers.
Further developments in PCT could significantly improve SDG&E's business case.

[7] Impact Evaluation of the California Statewide Pricing Pilot, Charles River Associates, Pg. 9, March 16, 2005

VII. IMPROVEMENTS - REDUCTIONS IN PROJECT COST

While DRA is not advocating a system with low functionality, we advocate including only those AMI functions that add a clearly identifiable marginal net benefit to the system. As such, we advocate inclusion of any additional functions that add clearly identifiable marginal benefit above the marginal function cost. However, our technical consultant, Mr. Hadden (Chapter 8), has determined that there are two demanding technical requirements that eliminated certain vendors and probably increased the cost, without providing any additional benefit that SDG&E has quantified. Specifically, SDG&E required that all AMI hardware manufacturers guarantee that a very high percentage of meter data be successfully received by the utility's central computers every day. SDG&E also required all vendors to propose systems with a "second communications channel" for recording energy produced by home solar PV systems. Excluding these unusual criteria may widen the field of competing bidders and reduce the price of the AMI meters and communications systems.

VIII. COMPARISON TO PG&E

The SDG&E AMI application is the second AMI proceeding to come before the Commission. Comparing SDG&E's application to PG&E's application is not an exact "apples-to-apples" comparison, because there are a multitude of differences between the two AMI proposals and between the utilities and their service territories. That said, there are enough similarities between the AMI applications that comparing the costs and benefits of SDG&E's proposed AMI system to PG&E's proposed AMI system is generally illustrative:

TABLE 1-2
Costs and Benefits
SDG&E Compared to PG&E[8]

	Avg. Operating Benefit [Approx $/ meter]	Avg. Total Cost [Approx $/ meter]	Operating as % of Cost
PG&E[9] Application	**$210**	[redacted]	[redacted]
SDG&E[10] Application	**$140**[11]	[redacted]	[redacted]
Difference SDG&E to PG&E	**-$70 (-33%)**	[redacted]	[redacted]

As shown in Table 1-2, the AMI system proposed by SDG&E has a slightly higher cost per meter than the PG&E system and the operating benefit per meter is much lower than the PG&E system. At the same time, SDG&E's total meter reading costs are about [redacted] less, on a cost per meter read basis, than those of PG&E (see Table 7-2 of Mr. Enderby's testimony). Therefore, the operational benefits per meter attributable to automating SDG&E's meter reading are significantly less than the corresponding operational benefits per meter in PG&E's territory. This

[8] PVRR 2006$, PG&E analysis period 2006-3030, SDG&E analysis period 2007-2026

[9] Excludes costs and benefits of PG&E's remote Turn-on/Cut-off switch.

[10] Excludes costs and benefits of programmable communicating thermostats (PCTs).

[11] Excludes avoided program costs ($73M in benefits in SDG&E's application)

difference appears to be largely due to the fact that meter reading labor costs for SDG&E are currently far below those of PG&E. As a result, SDG&E's business case is thereby dependent on achieving a much higher level of other benefits (including demand response), lower system costs, or both.

IX. ONE LIFETIME, 17 COMMUNICATION-YEARS

On the advice of Plexus Research, DRA finds the 17-year replacement cycle of electric meters and communications modules suggested by SDG&E for the proposed AMI system to be reasonable. However, DRA believes that the cost-benefit analysis should consider only one system lifetime - not the two concurrent system lifetimes SDG&E used for purposes of its cost-benefit analysis.

We do not believe we can predict, with sufficient confidence, the needs of San Diego ratepayers and the economics of energy industry starting in year 2025, to determine the AMI system best suited to replace the currently proposed system. Neither are we confident in accepting the currently proposed AMI technology for a second generation system, which SDG&E proposes to phase in from 2025-2027. Consequently, our cost-benefit analysis is based on the costs and benefits associated with the single lifetime AMI system purchase.

Removing SDG&E's second mass installation of AMI system meters from the cost-benefit analysis has a disproportionate affect on the benefits, because the capital cost of installing the second AMI system iteration was budgeted at only half the cost[12] of installing the first generation on a net present value basis. There appear to be two reasons for this. First, contingency costs were added to the cost of the first mass installation of meters but not to the second mass installation in 2025 to 2027. Second, the total number of meters involved in the first mass installation will exceed the second mass installation. This is because meters that were installed after the 2008 to 2011 deployment owing to load growth or replacement of broken meters would not

[12] See workpapers

need to be replaced during the second mass deployment in 2025 to 2027. Indeed, using meter failure estimates from Mr. Pruschki, only about [redacted] of the meters installed in the 2008-2010 would need to be replaced in the second mass installation of 2025-2027. They would be replaced sometime later, reducing their cost on a net present value basis.

SDG&E's complex assertions about the trailing or "horizon value" of the AMI system have no merit. Old technology is more likely to exhibit disposal costs than resale value. In order to accept that the system will directly create benefit in 2038, one would have to assume that AMI technology had not advanced sufficiently to cause a significant upgrading of SDG&E's AMI technology (no technology redesign cost was included in SDG&E's analysis). When the technology is upgraded, the subsequent benefits should accrue to that new technological system upgrade – not the 2006 version of AMI.

As I write this chapter, I am 35 years old, with a (nearly) full head of hair. I will be bald and retired by 2038 – the last year for which SDG&E claims credit under the current AMI technology. I don't expect that in my retirement I will be using the same PCS cell phone technology that I use today. I don't expect that I will be using the Pentium PC computer technology I use today. I don't believe SDG&E will be using 2006 AMI technology when I head down to Florida in 2035.

DRA has included the benefits that the growth and replacement meters can be expected to produce over the remainder of their lifetimes, as recommended by SDG&E in its response to Data Request #43. We have also included the residual book value in the costs. DRA questions, however, whether these meters would be left in place in the second mass deployment. It seems far more likely that SDG&E will upgrade the technology of the entire system when age requires the replacement of [redacted] of the original 2008-2010 mass installation in 2026. It is, at best, speculative to assign a positive residual value for two-decade-old computers, cell phones or AMI technologies. Furthermore, SDG&E's business case fails regardless of whether any costs and benefits are assigned to growth and replacement meters after 2026.